

REMARKS

Claims 1 and 3-5 are pending in the present application.

Applicants' Response to the Claim Rejections under 35 U.S.C. §103:

Claims 1 and 3-5 stand rejected under 35 U.S.C. 103(a) as being unpatentable over **Eybergen**. Applicants respectfully traverse on the basis that **Eybergen** does not teach nor suggest each and every limitation of the claimed invention. Specifically, **Eybergen** does not disclose the limitation of the flow rate not exceeding 1.4 times the flow rate corresponding to a tonnage set as a capacity which can pass a maximum flow rate. The Office Action asserts that this setting is "an obvious matter of design choice" on the basis that **Eybergen** is capable of being set to applicants' claims range because "**Eybergen** discloses all of the other claimed structural limitations."

Under U.S. patent law, the mere fact that the skilled artisan could rearrange the parts of the valve of **Eybergen** to meet the terms of the claims is not by itself sufficient to support a finding of obviousness. The reference must provide a motivation or reason for one skill in the art, without the benefit of applicants' specification to make the necessary changes to the valve of **Eybergen**.

The Office Action does not cite to any motivation in the prior art which recognizes setting the maximum flow rate to correspond to a level of not more than 1.4 times the flow rate corresponding to the set tonnage. Applicants have discovered as set forth in Figures 2-5B and pages 12, line 9 to page 16, line 7, that when the flow rate is set as claimed a reduction in start up noise is achieved.

The present invention is directed to an expansion valve that enables reducing noise generated when an air conditioner is started. To reduce noise, this invention sets the maximum value of valve lift such that a flow rate of refrigerant does not exceed 1.4 times a flow rate corresponding to set tonnage.

As for noise, the relationship between refrigerating capacity and noise is shown in FIG. 3. As can be seen, noise starts to steeply increase when the refrigerating capacity is beyond 1.4. Therefore, limiting the refrigerating capacity up to a scale factor of 1.4 when the expansion valve is fully open is very useful in reducing noise. As a result, startup noise can be reduced as shown in FIG. 4.

In order to prevent the valve portion from being lifted beyond the maximum value, the expansion valve of this invention has a mechanism of controlling the opening displacement of the diaphragm of the power element such that lifting of the valve portion is limited up to a position that allows refrigerant of a flow rate to flow, the flow rate being 1.4 times a flow rate corresponding to the set tonnage.

This control can be realized by bringing the center disk into abutment with the inner surface of the housing. This structure produces an effect of decreasing tolerance dispersion (see FIG. 5B; page 13, line 24 to page 16, line 7). **Eybergen** does not teach the features and effects of such a structure. Basically, an idea of limiting the maximum valve lift is not incorporated into conventional expansion valves including **Eybergen's**. Therefore, there is no motivation to use the inner surface of the housing as a stopper for the center disk, in order to limit the valve lift.

Eybergen does not teach nor suggest setting the valve in order to reduce noise. Rather, **Eybergen** teaches toward setting the valve based on temperature. Specifically, **Eybergen** discloses calibrating the cartridge subassembly 12 by exposing the capsule to fluid at a pre-selected temperature for calibration. The cap 30 is then rotated with respect to lower shell 28 to adjust the preload in spring 36 and the tubular extension 32 is rotated to adjust contact against operating rod 50 to open valve 44 to produce a desired flow through outlet ports 58, 60. See Col. 3, line 59 to Col. 4, line 3. Under U.S. patent law when a reference teaches away from a limitation, as **Eybergen** does in this instance, the reference cannot be utilized as evidence that obviousness exists.

In view of the above remarks, Applicants submit that that the claims, as previously presented, are in condition for allowance. Applicants request such action at an early date.


If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

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If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
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